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On the Bramid Fishes of the Gulf of Mexico[1]

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(Plates I-III)

Contents

I. Introduction

Berg (1947: 474) includes the Pteraclidae and Steinegeriidae within the Bramidae. Although this arrangement may be a natural one, it is convenient here to follow the older classifications (*e. g.* Jordan, 1923: 181) and restrict the family to the genera *Brama, Taractes, Collybus* and *Eumegistus* and their synonyms. The Pteraclidae can be separated from the Bramidae by the longer bases and more anterior origins of their vertical fins. The Steinegeriidae includes only *Steinegeria rubescens* Jordan & Evermann (1887) of which only the type is known. This specimen was collected from the stomach of a red "grouper" which was caught in the Gulf of Mexico off Pensacola, Florida. It is in poor condition. Although the systematic position of this fish has not been established, its nearly vertical mouth, non-falcate dorsal and anal fins, the enlarged spines of the caudal peduncle and its nearly flat forehead separate it from *Taractes, Collybus* and *Brama* of similar size. *Steinegeria rubescens* will be the subject of a later paper, but is excluded from further comment here. A revision of the major classification of the bramid-like fishes is needed as badly as an analysis of the species and of the allometric growth associated with each.

The family, as so restricted, is represented in the Gulf of Mexico by two species: *Collybus drachme,* reported here for the first time from five off-shore localities; and a species of *Taractes* which I have called *T. longipinnis* and which is also first recorded here from the Gulf of Mexico. Although my material is inadequate for an analysis of the non-Gulf bramids, I have reviewed some of these in order to more clearly establish the identity of these Gulf of Mexico specimens.

"Length" as used here refers to standard length unless otherwise qualified. All measurements over 100 mm. were made with dividers and recorded in millimeters. Measurements between 5 and 100 mm. were made with dividers or dial calipers and recorded in half millimeters. Measurements of less than five mm. were taken with a calibrated ocular grid micrometer and were recorded to the nearest tenth of a millimeter.

II. Material and Acknowledgements

The first Gulf bramid which came to my attention was a *Taractes* 74.0 mm. in standard length (85 mm. fork length) taken by the U.S. Fish and Wildlife Service vessel *Oregon* at station no. 1043, an experimental tuna long-line station occupied on May 11, 1954, at Lat. 24° 16′ N., Long. 92° 00′ W. The specimen was found in the stomach of a yellowfin tuna (*Neothunnus albacares*) which was caught at a depth of less than 35 fathoms. The superficial fin membranes had been largely digested and some of the scales, head bones and fin rays were damaged, but the fish was otherwise in good condition.

Four adult *Taractes* were caught on later *Oregon* cruises. All were taken by the long-line at depths less than 35 fathoms. These specimens, 376, 371, 357 and 349 mm. in standard length (418, 413, 394 and 390 mm. in fork length respectively), came from the following two *Oregon* stations:

[1]Contribution No. 973, Department of Tropical Research, New York Zoological Society.

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1173 28° 54′ N. Lat., 88° 02′ W. Long., August 25, 1954

1317 28° 23′ N. Lat., 88° 43′ W. Long., June 11, 1955

Three of these fish are now in the collections of the U.S. National Museum, where they bear the catalogue numbers US 157793 and US 164328. These specimens, and the types of *Collybus drachme* and *Steinegeria rubescens,* were made available by Dr. Leonard P. Schultz, Curator of Fishes.

Ten juvenile specimens of *Collybus drachme* were collected at the following *Oregon* stations:

1043 24° 16′ N. Lat., 92° 00′ W. Long., May 11, 1954

1065 20° 34′ N. Lat., 95° 37′ W. Long., May 21, 1954

1377 27° 43′ N. Lat., 88° 43′ W. Long., August, 1955

1484 20° 50′ N. Lat., 95° 53′ W. Long., April 3, 1956

1486 22° 25′ N. Lat., 97° 00′ W. Long., April 4, 1956

I am indebted to Stewart Springer and Harvey R. Bullis, Jr., of the U.S. Fish and Wildlife Service, Pascagoula, Mississippi, and Edgar L. Arnold, Jr., of the U.S. Fish and Wildlife Service, Galveston, Texas, for the original preservation of this *Oregon* material.

G. E. Maul, Curator of Fishes in the Museu Municipal do Funchal, Funchal, Madeira, has kindly sent information regarding *Taractes* from Madeiran waters, and Dr. E. H. Bryan, Jr., Curator of Collections in the Bishop Museum, Honolulu, has sent a photograph of a cast of *Collybus drachme.*

Comparative bramid material from the Bermuda collections of Dr. William Beebe is now deposited in the Natural History Museum of Stanford University and was made available by Dr. George S. Myers.

The large *Taractes* from Nova Scotia which was reported by Bigelow & Schroeder (1929; MCZ no. 31598) and a photograph of a 570 mm. (fork length) Portuguese *Taractes* sent to these authors by Dr. Alfredo Ramalho were made available by Drs. Henry B. Bigelow and William C. Schroeder of Harvard University and the Woods Hole Oceanographic Institution.

III. *Taractes longipinnis*

Since my study of the six western North Atlantic *Taractes* listed above indicates that they are specifically identical regardless of certain differences among them, it is necessary to describe the more striking similarities and differences among the individuals of this series.

A 357 mm. Gulf specimen (Pl. I, Fig. 1) was first compared with the 618 mm. fish reported by Bigelow & Schroeder (1929) from Cape Sable, Nova Scotia. These fish differ in several respects. In the smaller fish the ventral fins originate under the middle of the bases of the pectoral fins, while in the Nova Scotia specimen their origins are beneath the anterior edges of the pectoral bases. The 357 mm. specimen also has relatively longer dorsal and anal lobes than the 618 mm. specimen, but, as Barnard (1948: 357) has suggested and as will be more fully discussed below, a progressive relative shortening of these fin lobes accompanies an increase in length of the adult fish. The 357 mm. individual also differs in having spines on the posterior body scales, and its eye is a little smaller and more nearly circular than that of the larger fish. Differences such as these accompany the development of *Brama raii* and are therefore of doubtful phylogenetic significance here. The fin membrane connecting the posterior dorsal and anal fin rays extends beyond the scaly sheath to the tips of the fin rays in the 357 mm. fish, while in the 618 mm. one this membrane is limited to the proximal two-thirds of the fin; it does not extend beyond the scaly sheath.

In all other details, such as the distinctive shape of the caudal fin, the presence and nature of the transverse caudal grooves which lie immediately in advance of the dorsal and ventral procurrent caudal rays, the dentition, the gill rakers and their minute accessory spines and tubercles and the general body form (exclusive of fins), the 357 mm. Gulf of Mexico individual is the same as that from Nova Scotia.

The differences between the 74 mm. juvenile (Pl. I, Fig. 2) and the 357 mm. adult are more striking. In pattern and number of scales, if not in the shape of the individual scale, the specimens are similar. The larger fish has 44 rows of scales between the upper margin of the gill opening and the base of the mid-caudal rays (where a sharp change in scale size occurs); the smaller one has 45. The number of longitudinal rows, from the mid-dorsal line in front of the origin of the dorsal fin to the mid-ventral line before the anal origin, is 27 in the larger fish and 26 in the smaller. The adult has 17 scales along the ventral mid-line between the origin of the ventrals and anus while the small fish has 15. Although the fin membranes are partially missing on the juvenile, traces of scale pockets similar to those of the adult can be found on the dorsal, anal and caudal fins. The distinctive axillary scales of both pectoral and ventral fins are alike in the two fish. The snout, branchiostegal membrane and rami of the lower jaw are equally scaleless in the two individuals.

The character of the individual scales, on the

other hand, differs greatly between these two fish. Each body scale of the 74 mm. individual bears a strong spine, a characteristic of all known juvenile bramids and pteraelids. Considering only the spines along the median row of scales, those anterior to the 34th scale are directed backward; the last ten are directed forward. In the 357 mm. fish only the antrose spines on the posterior half of the body remain. All scales of Bigelow & Schroeder's 618 mm. fish are smooth. Each scale spine of the 74 and 357 mm. specimens originates near the center of the scale and protrudes through a notch in the posterior edge of the preceding scale. As the spines decrease in size anteriorly in the 357 mm. individual, these notches become less prominent. The same trend is apparent when a scale of the 74 mm. specimen is compared with one from the same point on the body of the 357 and 618 mm. specimens. Accompanying this change in scale form is a decrease in height of each scale. In the juvenile, the greatest height of a scale taken from the side of the body behind the pectoral fin is 3.5 to 4 times its greatest width, a ratio approaching the extremes encountered in such fishes as the grammicolepid zeoids and the bramid genus *Collybus*. The height of a scale from the same body location on the larger specimens is only one and one-half times its greatest width.

The premaxillary and mandibular teeth of the 357 and 74 mm. fish are very similar. The largest teeth of both jaws are the inner, anterior series of recurved canines. Some of the outer teeth of both jaws are directed slightly outward, a condition more apparent in the juvenile, in which the lips are somewhat macerated. The palatine teeth of the larger fish are better developed than those of the smaller. The vomer is toothless in both.

In number and shape of gill rakers and in position and degree of development of the accessory spines and hooks on each raker there are no significant differences between the 74 and 357 mm. fish. Exclusive of the rudiments, each has a raker count of 2+7. In addition, the epibranchial has three rudiments, which increase in length ventrally, and the hypobranchial has four. Each epibranchial raker has one or two medially-directed spines, while each raker of the ceratobranchial has three or four along its distal half. Each rudiment has a cluster of spines at its tip. In each fish there are also 4+9+4 spine-bearing tubercles on the inner side of the first gill arch. The 357 mm. specimen differs from the juvenile only in having 4 rather than 3 rudiments on the epibranchial, 6 instead of 4 on the hypobranchial, and in better developed spinules on the gill rakers and tubercles.

It is in the position and nature of the fins that the greatest differences between the juvenile and the adult are seen. Paramount among these is the nature of the dorsal and anal fins—falcate, with the rays filamentous and scarcely branched in the juvenile, less attenuated and with the rays branched in the larger fish (Table 1). The apparent difference in the position of the ventral fin could easily accompany growth from 74 to 357 mm., as could an increase in the amount of dermal material which supports the dorsal, anal and caudal lobes. A reduction in the length of filamentous fin rays is also undoubtedly a consequence of growth; such losses are known to occur during the development of many diverse species. Many fishes, conservative in form as adults, are adorned with various filamentous appendages as young. The change from lack of true branching in the fin rays of the juvenile cannot as readily be attributed to growth as these other fin differences, although juveniles of *Brama* have undivided or very weakly divided rays which later become fully branched (Lütken, 1880, pl. 4; Schmidt, 1918: 5).

No lateral line is visible on the 618 mm. specimen reported by Bigelow & Schroeder. The 357 mm. specimen, on the other hand, displays a series of about 13 modified scales which appear to represent a poorly-developed lateral line. This series begins above the upper end of the gill opening and arches posteriorly to a point below the middle of the dorsal lobe. A series of more typical lateral-line pores can be found on the corresponding scale row in the 74 mm. specimen. This series, also composed of 13 scales and terminating beneath the dorsal lobe, is slightly more arched than in the larger fish.

In both adult fish the premaxillary terminates anteriorly on a horizontal with the center of the eye and extends posteriorly to beneath the center of the eye. The free edge of the opercular bone is thin, entire and irregular in outline. The margins of the sub-, inter- and preopercle are membraneous. There are slight differences in degree of ossification and in the shape of the orbit. In both fish the orbit is nearly circular, while in Bigelow & Schroeder's 618 mm. fish the orbit is vertically elongate (the horizontal axis is contained 1.3 times in the vertical).

Both specimens have prominent transverse caudal grooves which lie above and below the caudal peduncle anterior to the procurrent caudal fin rays.

Although a direct comparison of the three additional Gulf of Mexico fish with the 618 mm. *Taractes* from Nova Scotia was not possible, no significant differences were found between these and the 357 mm. fish discussed above. The counts and measurements of the six western

TABLE 1.—COUNTS AND MEASUREMENTS OF SIX SPECIMENS OF *Taractes longipinnis* FROM THE WESTERN NORTH ATLANTIC

	Bigelow & Schroeder, 1929. Nova Scotia	*Oregon* Station 1173	*Oregon* Station 1173	*Oregon* Station 1112	*Oregon* Station 1317	*Oregon* Station 1043
Standard length (mm.)	618	376	371	357	349	74
Fork length (mm.)	670	418	413	394	390	85
Counts:						
Dorsal fin[1]	35	38½	37½	37½	37½	37
Anal fin[1]	28	29½	30½	29½	28½	28
Pectoral fin	20	22/22	21/21	21/20	21/21	20/21
Scales[2]	43	46	45	44	47	43
Gill rakers[3]	2+7	2+7	2+8	2+7	2+7	2+7
Measurements (% of standard length)						
Length of head	32.4	29.8	31.3	29.4	29.8	34.5
Length of snout	10.2	7.2	9.2	8.4	7.2	8.1
Length of premaxillary	14.7	14.4	15.1	14.6	13.8	16.9
Horizontal diameter of eye	6.6	5.9	6.5	5.9	6.3	10.8
Vertical diameter of eye	8.4	6.4	7.3	6.7	6.9	10.1
Width of interorbital	12.9	12.5	12.7	12.3	12.3	12.1
Greatest depth of body	52.1	54.5	55.0	55.5	55.3	58.8
Least depth of caudal peduncle	7.4	6.6	6.2	5.9	6.3	8.1
Snout to origin of anal fin	56.7[4]	53.7	55.2	58.8	56.1	54.0
Snout to origin of ventral fin	36.5[4]	32.5	34.2	37.5	33.8	30.4
Snout to origin of dorsal fin	44.8[4]	41.8	44.2	41.2	44.4	43.2
Height of dorsal lobe	28.3	49.5	51.7	47.9	50.7	63.5
Height of anal lobe	28.2	53.5	54.7	53.8	53.0	70.3
Length of mid-caudal rays	8.5	11.2	11.3	10.4	11.7	14.9
Length of pectoral fin	38.2	39.9	37.7	35.0	36.4	21.6
Length of ventral fin	7.0	8.5	6.7	8.4	8.3	12.1

[1]A combined count is used here since it is impossible to distinguish accurately between spines and soft rays without removing the overlying skin and scales.

[2]The row of scales which extends from the upper end of the gill cleft to the base of the caudal fin, exclusive of the small scales which cover the caudal base.

[3]Exclusive of rudiments.

[4]From Bigelow & Schroeder's figure (1929, pl. 1).

North Atlantic specimens are recorded in Table 1.

I mention the shapes of the caudal fins of these four Gulf of Mexico adults since they may be of later taxonomic interest. Two nominal species of *Taractes, T. brevoorti* and *T. saussuri,* are characterized by their biconcave caudal fins, *i. e.* the central rays of that fin are longer than those flanking them. In one of the four adult *Taractes* from the Gulf the central rays equal in length those on either side; in two others they are very slightly shorter, and in the fourth they are slightly longer. In none, however, is the margin of the caudal as strongly biconcave as in *T. brevoorti.*

In summary, the six western North Atlantic specimens of *Taractes* differ in the following respects: the shape of the caudal and vertical fins, form of the individual scales, presence or absence of poorly-developed lateral-line scales, shape of the eye, slight differences in body proportion, presence or absence of branching in dorsal and anal rays, and extent of the dorsal and anal fin membranes. Growth from juvenile to adult occurs in a less conservative manner in the bramids than in most acanthopterygian

fishes, in which an array of distinguishing features such as these would be of considerable taxonomic and nomenclatorial interest. In the Bramidae, however, differences between individuals of different size must be evaluated with reference to the great ontogenetic changes which are known to take place.

I do not hesitate to ascribe the decrease in relative height of the dorsal and anal lobes with increasing size to normal allometric adult growth (Pl. II, Fig. 3; Barnard, 1948: 374). Similarly, all known bramid juveniles have a spine on each scale which is gradually lost with growth; it is therefore appropriate to believe that the reduction in scale armature with increase in size in our series is a function of growth. I likewise ascribe the progressive shortening of the relative height of the individual scale to normal ontogenetic change, but feel hesitant about the significance of those scales in the 74 and 349-376 mm. fish which appear to represent a lateral line. Because of the intricate pattern and bizarre form of all scales it is difficult to trace the reduction in these possible lateral-line rudiments, if such a reduction occurs. Fitch (1953: 539) reported a lateral line in his 590 mm. California *Taractes,* and Jordan's *Eumegistus illustris,* obviously closely allied to, if not congeneric with, *Taractes,* has a lateral line. The lateral line may be variable in *Taractes* and will deserve close attention when a larger series becomes available.

If this evaluation is correct, the five western North Atlantic adult *Taractes* can be referred to a single species, for the only difference which distinguishes the four Gulf of Mexico fish from the larger one from Nova Scotia is the extent of the posterior dorsal and anal fin membranes. In the fish of 618 mm. the tips of the posterior dorsal and anal rays are free from the membrane; in the Gulf of Mexico fish the tips lie within this membrane. This characteristic is among those listed by Bigelow & Schroeder (1929: 45) as diagnostic of *Taractes princeps.* I hesitate to afford it such distinction, since the only *Taractes* which possess it are the largest known individuals: Bigelow & Schroeder's of 618 mm., Johnson's types of *T. princeps* (27 to 33 inches), Fitch's California fish (590 mm.) and, if it be admitted to *Taractes,* Jordan's *Eumegistus illustris* (about 608 mm.). In fishes such as some scombrids and carangids, the dorsal and anal finlets, separate and free from a connecting membrane in the large adult, are completely or partially enclosed in a fin membrane as juveniles and young adults. Parallel fin development may occur among the bramids.

An important difference between the 74 mm. Gulf juvenile and the five adults makes its identity with them less certain. In the juvenile *Taractes* the posterior dorsal and anal rays are unbranched, although there is an indistinct line distally which separates the anterior half from the posterior. In the adults these rays are branched nearly from their bases. Since the rays of the juvenile bramids figured by Lütken (1880), Sanzo (1928) and others are similar to those of our juvenile although the adults have completely divided rays, the separation of species by this character can be questioned. However, because of this difference, the morphometric differences shown in Table 1, the great difference in size between this 74 mm. fish and the next-smallest known *Taractes* (300 mm. fork length—Barnard, 1948: 375, pl. 10), and the general confusion attending past work on the juveniles of most pelagic spiny-rayed fishes, this specimen was compared with other species closely related to it in appearance if not in phylogeny.

The scale pattern, fin structure, general physiognomy and especially the presence of distinct transverse caudal grooves distinguish our juvenile from all of the bramids other than *Taractes* to which I have compared it. *Brama raii* and *Collybus drachme* of about the same length as our fish (85 and 81 mm. in fork length respectively) are represented in the collections of Stanford University's Natural History Museum. These are totally different from the juvenile *Taractes.* Although the young of *Eumegistus illustris, T. brevoorti, T. raschi* and *T. saussuri* are unknown, none of the adults has the prominent transverse groove on the caudal peduncle, a groove which is well developed in our juvenile. The prolonged dorsal and anal fin rays, which are filamentous, with only the suggestion of branching, are reminiscent of those of the heterogeneous assemblage of species reported by Jordan (1919), but since the dorsal fin of our *Taractes* originates well behind the eye and the anal a considerable distance behind the ventral fins, I did not study in detail *Pteraclis* and the various nominal species of *Pterycombus* and *Centropholis* (Barnard, 1927: 598; Kuronuma, 1941: 56; Belloc, 1927: 239; and others). The juvenile *Taractes* is also quite distinct from the berycoid fishes which probably resemble it when young: *Trachyberyx barretoi* and *Trachichtodes spinosus.* There is little reason to believe that the 74 mm. Gulf juvenile belongs to a genus other than *Taractes.*

Taxonomic status of the western North Atlantic TARACTES.—Although most of the nomenclatorial and taxonomic difficulties which confronted Bigelow & Schroeder when they reviewed this genus in 1929 are still extant, more recent work and additional material justify a reappraisal of *Taractes* taxonomy here.

With the exclusion of *Collybus* Snyder and *Eumegistus* Jordan & Jordan, the Bramidae can be divided into the two natural groups proposed by Smitt (1892-95) and recognized by Bigelow & Schroeder (1929): those forms with more than 70 scales in a median series, *Brama,* and those with fewer than 60, *Taractes.* I am concerned here only with the few-scaled species, of which the following nominal representatives are known:

Taractes asper (Lowe, 1843)	Madeira
T. longipinnis (Lowe, 1843)	Madeira
T. brevoorti (Poey, 1861)	Cuba
T. raschi (Esmark, 1862)	Norway
T. princeps Johnson, 1863	Madeira
T. saussuri (Lunel, 1866)	Cuba
T. steindachneri (Döderlein, 1883)	Japan
T. platycephalus Matsubara, 1936	Japan
T. miltonis, Whitley, 1938	Australia

I have tentatively omitted *Eumegistus illustris* Jordan & Jordan (1922: 36) from *Taractes,* although its close resemblance cannot be ignored. Because of its lateral line and smooth-edged scales, *Eumegistus* has been considered generically distinct from *Taractes,* but I have noted above the variation in the lateral line found in specimens of *Taractes,* and both the scale spine and the notch in the rear edge of each scale in young *Brama* and *Taractes* disappear with age. Jordan & Jordan's type specimen of *E. illustris* was a large individual, about 608 mm. in length. There are, however, meristic differences between *E. illustris* and the nominal species of *Taractes.*

Fowler (1938: 44) based his description of *Brama leucotaenia* on a juvenile specimen 22.5 mm. in standard length from the Philippine Islands. Fowler compares his fish with *Brama raii* and distinguishes it from that species by the pigmentation of the dorsal fin. However, his comparison of *B. leucotaenia* with *B. raii* is of little moment since the large scales (53 in a median longitudinal series) show it to be more closely related to *Taractes.* Although I have examined Fowler's type (U.S. National Museum no. US 98817), I have not undertaken a detailed study of its relationship. Since in scale count, number of gill rakers (about 5+10) and position and extent of the lateral line it more nearly resembles *Eumegistus illustris* than any known *Taractes,* I consider this juvenile fish generically and probably specifically identical with *Eumegistus illustris.*

Collybus bears little resemblance to *Taractes* or *Brama.* More will be said of *Collybus* later.

The identity of *Taractes asper* is uncertain. Lowe's description is inadequate and the type (from Madeira) cannot be located. This fish has traditionally been considered a young stage of *T. longipinnis,* which Lowe described on the preceding page of the same paper (1843: 82). However, *T. asper* may be the young of an entirely different bramid-like fish. Mr. G. E. Maul (in correspondence) has pointed out to me the similarity between Lowe's description of *T. asper* and the berycoid species *Trachyberyx barretoi* Roule. I can contribute no original information in clarification of this question and will omit *Taractes asper* from further consideration here.

Omitting *Eumegistus, Collybus* and *T. asper,* a natural subdivision of the remaining *Taractes* species suggests itself. Gross differences in body proportions and fin structure distinguish *Taractes longipinnis* of Lowe and its allies from the type of *T. raschi,* a second specimen referred to *T. longipinnis* by Smitt *et al.* (1892-95: 80), and Matsubara's *T. platycephalus.* In body form, fin structure and scale pattern, if not in more detailed features, there is little in common between these three fishes and representatives of the *T. longipinnis* group of similar size. The type figures of *T. raschi* and *T. platycephalus* are reproduced here (Pl. II, Fig. 4; Pl. III, Fig. 5). It is unfortunate that Matsubara did not consider in more detail the resemblance between his *T. platycephalus* and Esmark's type of *T. raschi* rather than accepting Smitt's synonymy, which places *T. raschi* in the synonymy of *T. longipinnis,* and basing his comparison on Bigelow & Schroeder's paper. I have seen neither species, but if the fin structure and shape are subject to growth changes as pronounced as those in *Brama* and *T. longipinnis,* and if the vomerine dentition is as variable in *Taractes* as Lunel found it to be in *Brama,* it is difficult to characterize *T. platycephalus.*

The second subdivision of *Taractes* includes the deeper-bodied species in which both young and adults have strongly falcate dorsal and anal lobes, more steeply inclined foreheads, and distinctive squamation: *T. longipinnis* (Lowe, not of Smitt), *T. princeps, T. brevoorti, T. steindachneri, T. saussuri* and *T. miltonis.*

Döderlein's *T. steindachneri* (*in*: Steindachner & Döderlein, 1883, pl. 7) has been referred to the synonymy of *T. longipinnis* by Steindachner & Döderlein (1884: 174), a disposition accepted by Bigelow & Schroeder. It was resurrected by Jordan, Tanaka & Snyder (1913: 134), Matsubara (1936) and others on the basis of slight differences in scale and fin-ray counts. The species might better have remained in synonymy.

Taractes brevoorti and *T. saussuri* (Pl. III, Fig. 6) are alike in having a double-concave caudal fin. Although one of the Gulf of Mexico adults which I have examined has central caudal rays slightly longer than those flanking them,

no recent specimens of *Taractes* approach the extreme condition shown by *T. saussuri*. These two species must be retained. *T. brevoorti* appears to be closely related to *T. longipinnis*. *T. saussuri*, on the other hand, is intermediate between *T. longipinnis* and *T. raschi* in body form and fin structure. Nothing further can be said about these species until specimens become available.

Whitley (1938: 193) distinguishes his Australian *Taractes miltonis* from the fish described by Bigelow & Schroeder (1929) as follows:

"Head, body, scale, and fin characters agreeing excellently with the detailed description of the allied *Taractes princeps* (Johnson) recently given by Bigelow and Schroeder (Bull. Mus. Comp. Zool. Harvard, lxix., 2, February, 1929, p. 45 and plate —) but is of slightly larger size and is distinguished by having the eye-diameter about one-fourth, instead of about one-fifth the length of the head; anal lobe considerably shorter than head; comparatively longer pectoral and ventral fins; distance from ventral origin to anal origin notably less than length of head; different gill-rakers, etc."

Whitley does not describe the differences in gill rakers. The horizontal diameter of the eye of his specimen is 7.2 percent. of standard length *cf.* 5.9-6.6 in the western North Atlantic adult specimens (Table 1); the vertical diameter is 8.3 *cf.* 6.4-8.4. The head length he reported, 200 mm. or 27.8 percent. of standard length, is 2 percent. shorter than any known western North Atlantic adult. I have noted elsewhere the relative reduction in the height of the anal fin lobe with increasing length of fish in *Taractes longipinnis* and Whitley's measurement, 140 mm. or 19.5 percent. of standard length, is not out of accord with this growth change. There is no notable difference in the distance between the origins of the ventral and anal fins between Whitley's fish and Bigelow & Schroeder's (about 1 percent. of standard length), and his measurements of the lengths of the pectoral and ventral fins (35.9 and 7.65 percent. respectively) are within the range of the adult western North Atlantic material (35.0-39.9 percent. and 6.7-8.5 percent. respectively). *Taractes miltonis*, as described by Whitley, is devoid of distinguishing characteristics. This species, along with *T. steindachneri* and *T. princeps*, should go into the synonymy of *T. longipinnis*.

Taractes longipinnis and *T. princeps* were subjected to a detailed comparison by Bigelow & Schroeder (1929). These authors tentatively retained both species, listing the following combination of characters as diagnostic of *T. princeps* (p. 45):

"1. Very deeply lunate tail.
2. The fact that the low rays of the anal and dorsal fins are distally free from the membrane for about a third of their length.
3. Great length of the anterior dorsal and anal rays.
4. Scales smooth, without hooks or spines (at least in adult).
5. Caudal pits present."

Bigelow & Schroeder's recognition of both species reflects a careful study of the problem and is the more conservative course. Since neither type is still extant, an understanding of the relationship between *Taractes longipinnis* and *T. princeps* awaits the comparison of series of specimens from the type locality, Madeira. Maul, however, who has seen many *Taractes* during his long association with the Madeiran fishery, can distinguish but one species, which he refers to *T. longipinnis* (personal communication). If it seems probable that a large series of specimens would show that the two nominal species are identical, it would be reasonable to combine the two at this time—the course recommended by those ichthyologists who have been able to examine more than one specimen. I prefer this alternative, for my material influences the interpretation of three of the distinguishing characteristics afforded *T. princeps* by Bigelow & Schroeder and the remaining two are of dubious significance in the absence of confirming material. If my 74 mm. juvenile and Barnard's 268 mm. adult are correctly referred to *Taractes*, the shape of the caudal fin changes with growth from a shallow fork to the deeply lunate form seen in the largest specimen. Similarly, there can be little doubt that the lobes of the dorsal and anal become relatively shorter during adult growth, and that there occurs a loss of scale spines and a change in the shape of the scale itself during development. Two peculiarities remain to characterize *T. princeps*: the presence of caudal pits and the absence of an interradial membrane between the posterior dorsal and anal rays. Lowe did not mention caudal grooves in his brief description of *T. longipinnis*. They may or may not have been present. As noted elsewhere, the dorsal and anal rays are free from the interradial membrane only in the largest *Taractes*, and this difference alone seems inadequate for the separation of *T. longipinnis* and *T. princeps*.

I have not attempted to review the generic nomenclature. I cannot concur in deBuen's (1935: 102) union of *Brama* and *Taractes* or with his suppression of the generic name *Brama* in favor of *Lepidotus*. *Lepidotus* Asso (1801) was used by deBuen (1935: 102), Whitley (1938: 191) and Fowler (1949: 74) in place of *Brama* (Bloch & Schneider, 1801: 98) — the needless suppression of a generic name which

had been universally accepted for more than a century. The respective dates of publication, within the year 1801, have not been determined or at least were not discussed by the recent proponents of the generic name *Lepidotus. Taractes* is used here because it has been applied customarily to the species discussed in this paper and because there is no nomenclatorial reason for its suppression.

Since I have concluded that all of the individuals which are known from the western North Atlantic are alike and that this series possesses features which weaken the argument provided by Bigelow & Schroeder for the separation of *T. princeps* and *T. longipinnis,* I suggest that the population represented by these individuals should bear the name *Taractes longipinnis* Lowe.

I propose the following tentative synopsis of the species of *Taractes*:

I. Fewer than 50 scales in a median longitudinal series exclusive of the small scales overlying the base of the central caudal fin rays.

A. Caudal fin "rounded." (A species of uncertain identity).....*T. asper*

AA. Caudal fin emarginate, forked or biconcave.

B. Standard length more than twice the greatest body depth. Pectoral fin with 17-18 rays.

C. Caudal fin emarginate. Forehead concave, less than an eye's diameter between upper edge of eye and dorsal profile of head.

D. Vomer toothed. (North Atlantic; syn.: *T. longipinnis* of Smitt, not of Lowe).....*T. raschi*

DD. Vomer toothless. (Japan).
T. platycephalus

CC. Caudal fin biconcave; tips of central rays on a line with tips of the outer caudal rays. More than an eye's diameter between eye and dorsal profile. Forehead convex. (Cuba).....*T. saussuri*

BB. Standard length less than twice the greatest body depth. Pectoral fin with 19-21 rays.

E. Caudal fin emarginate. (Atlantic and Pacific; syn.: *T. steindachneri, T. princeps, T. miltonis,* not *T. longipinnis* of Smitt).....*T. longipinnis*

EE. Caudal fin biconcave. (Cuba).
T. brevoorti

IV. *Collybus drachme*

As well as from the type locality (Hawaii), *Collybus drachme* Snyder (1904: 525; fig. 7) has been caught off Bermuda (Kanazawa, 1952: 80). Twelve specimens have been taken in the Gulf of Mexico, all from the stomachs of yellowfin tuna and lancet fish (*Alepisaurus*) caught at the five *Oregon* stations listed earlier in this paper. They range in standard length from 33.0 to 52.5 mm. and are in various stages of digestion. A 42.5 mm. fish was cleared and stained and examined for skeletal characteristics. I have also compared the twelve specimens with Snyder's type and cotypes, which are now in the U.S. National Museum and in the Natural History Museum, Stanford University.

I use Snyder's trivial name, *drachme,* for these Gulf of Mexico specimens since I have found no significant differences between representatives from the two oceans.

The largest known *Collybus* which has been described or figured is Snyder's 81 mm. Hawaiian type. Fowler (1928: 138) reported three larger (167-186 mm.) specimens obtained in Honolulu and now in the Bishop Museum and Jordan & Jordan (1922: 35) referred to a cast of a large individual, also in the Bishop Museum. A photograph of this cast portrays a fish about 155 mm. in length, but few details of the original fish can be discerned. The physiognomy and shape and position of the fins are similar to those of *Brama* and to Snyder's larger specimens of *Collybus.* This cast was certainly not made from a *Taractes.* Some authors have suggested that *Collybus* represents the young of a species of *Brama* or *Taractes,* a view that I am reluctant to accept. The scale count separates *Collybus* from *Brama* (45-55 *cf.* 70-80 in *Brama*) and our juvenile *Taractes,* 74 mm. long, is much thicker-bodied and has more falcate fins than any *Collybus* that I have seen. *Collybus* may represent a young *T. raschi* or *Eumegistus,* but pending evidence to the contrary, *Collybus drachme* should be recognized.

The following diagnosis is a composite taken from my twelve Gulf individuals, no one of which is undamaged:

Body compressed, eliptical in outline with a ventral profile more strongly convex than the dorsal. Eye large and circular, not entering into the dorsal profile, eye diameter 2.5-2.7 in head. Mouth oblique, premaxillary extending to beneath middle of pupil. Lower jaw coterminal with upper or slightly protruding. Head 3.0-3.4 in standard length; opercular bones smooth, although the elongate scales overlying the free edges are serrated. Greatest depth of body, at origin of dorsal fin, 1.5-1.8 in standard length. Least depth of caudal peduncle 3.5-4.5 in head. Lateral line usually absent, occasionally present, complete or incomplete. Head and body lightly pigmented, a sprinkling of melanophores below

orbit, along bases of all fins, on peritoneum and along dorsal edge of body.

D.: 32-34. A.: 28-29. P.: 20-21. Gill rakers: 2-3 + 8-9. Scales in a median series: 46-54; about 18 horizontal rows on body, counted obliquely upward and backward from the origin of anal fin. Vertebrae (one specimen only): 38.

Snout and forehead in front of center of eye scaleless but covered with small pores. Remainder of head and body scaled. Scales along bases of dorsal and anal fins and in axil of pectoral and ventral fins. Scales varied, those on head more strongly ctenoid than those on body. All scales vertically elongated, those on middle of body extremely attenuated, the width contained about nine times in the height. All scales with a vertical ridge and a central protruding spine or knob. About 14 keeled scales along the ventral midline between origin of pelvic fins and that of anal.

Teeth on jaws; none on vomer or palatines. Mandibular teeth in a single row posteriorly, a band anteriorly. Outermost anterior teeth recurved and enlarged. Two fangs at inner edge of anterior band at tip of mandible. Premaxillary teeth similar to those on mandible, but without anterior fangs.

Measurements, expressed as percent. of standard length: length of head, 29.9-33.9; length of snout, 5.3-7.7; length of premaxillary, 14.7-16.9; diameter of eye, 11.4-12.7. Greatest depth of body, 56.8-66.2 (decreasing with increasing length of fish), least depth of caudal peduncle, 8.3-12.7. Height of dorsal lobe, 21.1-23.9; height of anal fin, 8.4-10.4; length of pectoral fin, 27.4-32.2; length of ventral fin, 10.6-12.3.

V. Summary

Except for the controversial *Steinegeria rubescens,* no species of non-pteraclid bramid fish has hitherto been reported from the Gulf of Mexico. The off-shore collections of the U.S. Fish and Wildlife Service vessel *Oregon* contain representatives of two such species, which are identified here with *Taractes longipinnis* Lowe and *Collybus drachme* Snyder. Both are described, growth changes in *Taractes longipinnis* are discussed, and the nominal species of *Taractes* are reviewed.

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EXPLANATION OF THE PLATES

Plate I

Fig. 1. *Taractes longipinnis* from *Oregon* station 1112 (Gulf of Mexico). Standard length: 357 mm. (Photograph courtesy of the Woods Hole Oceanographic Institution).

Fig. 2. *Taractes longipinnis* from *Oregon* station 1043 (Gulf of Mexico). Drawn, with some reconstruction, from a damaged juvenile 74 mm. in standard length. (Drawn by Janet Roemhild).

Plate II

Fig. 3. Profiles of five specimens of Atlantic *Taractes longipinnis*. From the smallest to the largest, the data from which these profiles were drawn were taken from (a) the 74 mm. Gulf of Mexico juvenile; (b) a South African adult of about 268 mm., from Barnard, 1948; (c) a 357 mm. Gulf of Mexico adult; (d) a 618 mm. adult from Nova Scotia, from Bigelow & Schroeder, 1929; and (e) a South African adult of about 706 mm., from Barnard, 1948.

Fig. 4. *Taractes raschi.* After Smitt *et. al.,* 1892-95, p. 80, fig. 24; from Esmark, 1862, pl. 1.

Plate III

Fig. 5. *Taractes platycephalus.* From Matsubara, 1936, p. 297, fig. 1.

Fig. 6. *Taractes saussuri.* From Lunel, 1866, pl. 2.

Fig. 7 *Collybus drachme* from *Oregon* station 1065 (Gulf of Mexico). Standard length: 33.0 mm. (Drawn by Janet Roemhild).